Annals of African Medicine
Vol. 8, No. 3; 2009:168-172

Original Article

A 10-year review of outcome of management of tetanus in adults at a Nigerian tertiary hospital

Onwuchekwa Arthur Chukwubike, Asekomeh Eshiofe God'spower

Neurology Unit, Department of Internal Medicine, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria

Correspondence to: Dr. A. C. Onwuchekwa, Neurology Unit, Department of Internal Medicine, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria. E-mail: ac_onwuchekwa@yahoo.com

Abstract

Background: Tetanus remains one of the major public health hazards of the developing world. Previous studies in Nigeria indicate that mortality ranged from 26% to 60%. Mortality is much lower in the developed world because of the availability of facilities for intensive care of cases, unlike in most developing countries.
Aim: To report our experience with the management of adult tetanus at the University of Port Harcourt Teaching Hospital over the past 10 years (1996-2005).
Methods: Data of all patients aged 16 years and above managed for tetanus in the medical wards between January 1996 and December 2005 were retrieved from their case records and analyzed.
Results: Eighty-six patients were managed for tetanus (50 males and 36 females), constituting about 1% of all medical admissions over the 10-year period. Students, civil servants and commercial motorcyclists formed the major groups at risk. The commonest portal of entry was lower limb injuries (54%). Case fatality rate (CFR) was 42.9%, with a statistically significant higher CFR found among patients above 40 years of age (*P*= .000), patients with incubation period shorter than 7 days (*P*= .04), those with a shorter duration of hospitalization (*P*= .000) and those administered higher average daily diazepam doses (*P*= .044). Complications such as aspiration pneumonitis, laryngospasm and respiratory failure were major causes of mortality.
Conclusion: Case fatality rate of tetanus has remained consistently high at our center. Factors that were significantly associated with high mortality included older age, age above 40 years , incubation period of less than 7 days and higher degree of sedation with diazepam. It is recommended that preventive immunization against tetanus be given to all Nigerians with secondary vaccination at adulthood.

Keywords: Outcome, tertiary hospital, tetanus

Résumé

arrière-plan : tétanos reste l'un des dangers de santé publique majeur du monde en développement. De précédentes études au Nigeria, mortalité allait from26 % à 60 %. La mortalité est beaucoup plus faible en les pays développés en raison de la disponibilité des installations de forte intensité soin de cas contrairement à la plupart des pays en développement.
but : pour signaler notre expérience de la gestion du tétanos adulte dans l'hôpital d'enseignement University de Port Harcourt sur la cours des dix dernières années (1996-2005).
méthodes : données de tous les patients âgés de 16 ans et au-dessus de géré pour le tétanos dans les quartiers médicales entre janvier 1996 et décembre 2005 ont été extraites de leurs enregistrements affaires et analysées.
résultats : quatre-vingt six patients étaient gérés pour le tétanos (50 mâles et 36 femelles), qui constituent environ 1 % de tout médicale admission sur la période de 10 ans. Étudiant, fonctionnaires et commercial moteurs cyclistes ont formé les principaux groupes à risque. La plus courante portail d'entrée a été blessé un membre inférieur (54 %). Taux de létalité (CFR) s'est 42.9 %, avec un statistiquement significative CFR plus élevé chez les patients au-dessus de 40 ans (p = 0.000), patients avec période d'incubation plus courte que 7 jours (p = 0,04), ces pour une durée plus courte de l'hospitalisation (p = 0.000) et administré supérieur en moyenne quotidiennement les doses de diazépam (p = 0.044) .Complications comme aspiration pneumonitis, de laryngospasm et d'insuffisance respiratoire étaient

grandes causes de taux de mortalité.
conclusion : taux d'accidents mortels cas de tétanos a restés constamment élevés dans notre centre. Facteurs qui ont été considérablement associé à forte mortalité incluse leur vieillesse au-dessus de quarante ans, incubation période de moins de sept jours et plus haut degré de sédation avec diazépam. Il est recommandé que la vaccination préventive contre le tétanos être donné à tous Nigérians avec vaccination secondaire à l'âge adulte.

Mots cles: tétanos, le résultat. Hôpital tertiaire

DOI: 10.4103/1596-3519.57239 **PMID:** 19884693

Introduction

Tetanus remains one of the major public health hazards of the developing world. In spite of availability of effective preventive vaccines, its prevalence remains high in most developing countries.[1] It is the second most common neurological infection requiring admission at the University of Port Harcourt Teaching Hospital (UPTH).[2] In Nigeria, mortality from adult tetanus ranged between 26% and 60%.[3] An equally high mortality has been reported in cases of neonatal tetanus.[4,5] Mortality is much lower in the developed world because of the availability of facilities for intensive care of cases, which is often unavailable in most developing countries.[6]

Adult tetanus cases are managed in the medical wards of UPTH. The hospital serves as the main referral center for Rivers State and the neighboring states of Bayelsa, Akwa-Ibom and Abia. Until recently, facilities for mechanical ventilatory support were not available in the intensive care unit (ICU) of UPTH. Tetanus management had been conservative with use of parenteral diazepam to prevent or control muscle spasms, anti-tetanus serum to neutralize unbound toxins and crystalline penicillin or metronidazole to prevent further production of toxins. Adequate circulatory support was given with 5% dextrose saline while tetanus patients were nursed in quiet corners in the wards to reduce spasm stimulation. These measures were helpful, but the absence of mechanical ventilatory support in the ICU might have contributed to the high mortality observed in previous studies.[7,8]

This study takes a look at the management of tetanus in UPTH over the past 10 years (1996-2005) with a view to compare treatment outcome with findings of previous studies from this center and other centers in developing countries; form a baseline for future comparison at our center, which now has an ICU with facilities for mechanical ventilation; determine poor prognostic factors and complications in our patients; and specifically determine the effect of the diazepam dosage used on treatment outcome.

Methods

Retrospective case-note review

The case records of all patients aged 16 years and above managed for tetanus in the medical wards between January 1996 and December 2005 were identified from the ward register. The folders were retrieved from the medical records department of UPTH and analyzed.

Socio-demographic parameters and clinical information such as age, sex, occupation, immunization status, portal of entry, incubation period, period of onset, duration of hospital stay, average daily dose of diazepam, complications and management outcome were extracted from the case records.

The diagnosis of tetanus was based on the presence of at least 2 of the following clinical features:

a) Trismus with or without risus sardonicus
b) Rigidity of the abdominal wall and/ or cervical muscle
c) Reflex spasm (spontaneous and/ or provocative)

Statistical analysis

Data was analyzed using SPSS 11 statistical package.[9] Continuous variables were compared by

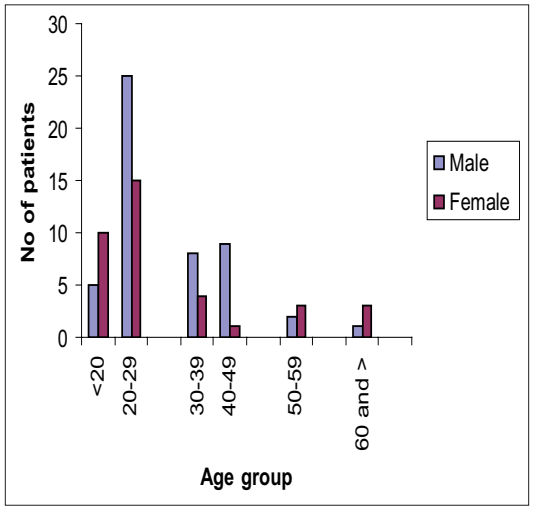

Figure 1: Bar chart of age-sex distribution of patients

the Student *t* test. Proportions were analyzed with the chi-square test or 2-tailed Fisher's exact test as appropriate. A *P* value of 0.05 or less was considered statistically significant.

Results

Eighty-six cases of tetanus were managed from January 1996 to December 2005. Of these, complete information was available on only 50 (58.1%) cases, while there was some missing data on 36 (41.9%) cases. The number of patients admitted to the adult medical wards during the same period was 8,762. Tetanus constituted about 1% of all medical admissions over the 10-year period. In the first 5 years of the reviewed period (1996-2000), 24 patients were managed while the other 62 patients were managed in the period 2001-2005, indicating an increase in prevalence.

There were 50 (58.1%) males and 36 (41.9%) females, giving a male-to-female ratio of 1.3:1. The mean age of the patients was 30.16 + 13.9 years (range, 16-90 years). The mean age of male patients was 30.26 + 11.2 years, while that of female patients was 30.03 + 17.1 years. Sixty-five (75.6%) patients were below 40 years of age, while 21 (24.4%) were aged 40 years and above [Figure 1].

Students and civil servants accounted for 44% of the patients, while artisans and commercial motorcyclists made up another 36%. Farmers made up a paltry 4.0% in this cohort of patients [Table 1].

Complications were identified in 45 (52.3%) patients. These were aspiration pneumonitis- 22 (25.6%), laryngospasm- 5 (5.9%) and respiratory failure- 3 (3.5%). Multiple complications were identified in 15 (17.4%) patients.

Among the 86 patients managed in the 10-year period, 44 (51.2%) survived while 33 (38.4%) died.

Table 1: Occupational distribution of patients

Occupation	No. of Patients	% of Patients
Student	13	26
Civil servant	9	18
Artisan	8	16
Motor cyclist	5	10
Trader/business	3	6
Unemployed	3	6
Armed forces	3	6
Farmers	2	4
Unskilled Labor	2	4
House help	1	2
Housewife	1	2
Total	50	100

The outcome of 4 (4.6%) patients could not be ascertained as they had incomplete records. Three (3.5%) patients were transferred to another hospital in Port Harcourt (a general hospital), while 2 (2.3%) patients discharged themselves against medical advice. Out of the 77 patients with known outcome, 33 died, constituting a case fatality rate (CFR) of 42.9%. Of the total deaths, CFR for males was 43.5%, while the CFR for females was 41.9%. There was a statistically significant difference between the mean age of patients who survived (26.91 + 9.93 years) and that of patients who died (30.99 + 14.34 years) (P= 0.003). The case fatality rate for all patients under the age of 40 was 30.4%, while that for patients aged 40 and above was 76.2% (P= 0.000).

Analysis of results of the 50 patients with complete records showed that 10 (20%) patients had prior tetanus immunization, while the other 40 (80.0%) were not immunized or did not know their immunization status. The sex distribution was such that 8 (25%) male patients were immunized, while only 2 (11.1%) of the female patients were immunized. The commonest portal of entry was injury to the lower limb, 27 (54%) of the cases. Injuries to the upper limbs, head and neck region were in 19 (38%) cases. Injuries were mainly lacerations from assaults, occupational accidents and nail puncture wounds. There were 2 (4%) post-abortal cases. There was 1 (2%) case from breast abscess and 1 (2%) case from postoperative abdominal wound infection following exploratory laparotomy in a private clinic.

Analysis of period of onset showed that 58.1% of the patients had period of onset of 48 hours or more, while the other 41.9% had period of onset of less than 48 hours. (This includes 2 patients who developed trismus and spasms simultaneously and another who had spasms before onset of trismus.)

Factors that were significantly associated with mortality included older age (P= 0.003), age above 40 years (P= 0.000), incubation period of less than 7 days (P= 0.04). The mean duration of hospitalization for patients who survived was 20.8 ± 7.2 days, compared to 7.0 ± 8.8 days for patients who died (P= 0.000). The mean average daily diazepam administered was 80.8 ± 74.2 mg for patients who survived, compared to 131.3 ± 92.9 mg for patients who died (P= 0.044) [Table 2].

Discussion

Tetanus constituted about 1% of all medical admissions over the reviewed period. This is slightly lower than the 1.36% for the 5-year

Table 2: Prognostic factors

Factors	No. of patients who died		P-value
	n	%	
Age			
<40 yrs	17/39	30.4	0.000*
>40 yrs	16/21	76.2	
Sex			
Male	20/46	43.5	0.893
Female	13/31	41/9	
Incubation period (days)			
<7	6/7	85.7	0.04*
>7	13/38	34.2	
Period of onset (hours)			
<48	9/16	56.2	0.47
>48 hrs	5/12	51.7	
Prior immunization			
Yes	3/10	30	0.45
No	16/37	43.2	
Debridement done			
Yes	2/8	25	0.26
No	15/32	36.9	
Anti-tetanus serum given			
Yes	16/42	38.1	0.12
No	2/2	100	
Reacted	0/2	0	
Human tetanus	1/1	100	
Immunoglobulin			
Fever			
Yes	14/32	43.7	0.5
No	5/15	33.3	
Tachycardia			
Yes	15/39	38.5	0.54
No	4/8	50	

*statistically significant

period June 1991 to May 1995, previously reported from this center.[8] Tetanus constituted 0.65% and 7% of all emergency admissions reported from Ile-Ife and Lagos, respectively — all in southwest Nigeria.[10,11] Prevalence in the United States of America is put at 0.15 per 100,000 population.[6] Factors implicated for the high prevalence of tetanus in developing countries include poor wound management, poor personal hygiene, lack of immunization and ignorance.[10] The apparent increase in the prevalence of tetanus between 2001 and 2005 compared to previous 5 years (1996-2000) may have been due to incessant strikes by various trade union groups in the hospital before 2001. This may have deterred patients and their relations from coming to UPTH during that period. The same trend was earlier reported from this center and Zaria.[12]

The male preponderance in this study has been reported elsewhere[10,13,14] and has been attributed to the fact that males are more involved in outdoor jobs like farming and commercial motorcycling, which have greater proneness to injury. Females are also expected to be more immunized due to routine tetanus immunization in pregnancy; although in the affected patients, only 11.1% of the female patients had prior tetanus immunization compared to 32% of male patients. This may reflect poor coverage of the present efforts at tetanus vaccination of pregnant women during routine antenatal visits. Ignorance on the part of patients and poor enlightenment from government could also be contributory.

Students and civil servants accounted for 46.5% of the patients, while artisans and commercial motorcyclists made up another 25.6%. Farmers made up a paltry 4.7% in this cohort of patients [Table 2]. This contrasts with studies from other centers in Nigeria, where farming was the dominant occupational group.[10,13] Port Harcourt is an urban center and is the center of activity of the Nigerian oil industry. Majority of the work force here is engaged in the oil industry and its related disciplines, where safety measures are given high priority; hence the relative low incidence of tetanus at our center. The large percentage of students in this patient cohort may be due to ignorance, which raises the need for compulsory tetanus immunization at school entry and pre-employment, as obtains in developed countries.[6] This will augment current efforts of the tetanus immunization program in Nigeria, which are only targeted at children and pregnant women.

Similar to reports from other centers, the most common portal of entry among patients in this study was the lower limb, which constituted 54.7% of all the patients. The preponderance of lower limb injury in this study is thought to result from poor protective footwear outside the industries. A majority of people in the rural areas that are involved in outdoor jobs have no form of protective wear.

The overall case fatality rate (CFR) from this study was 42.9%. The case fatality rate ranged from 33.3% in patients less than 20 years of age to 75% for those aged 60 years and above. The case fatality rate for all patients under the age of 40 was 30.4%, while that for patients aged 40 and above was 76.2% ($P < 0.005$). In an earlier study by Odia and Njoku over a 5-year period, in this center, a case fatality rate of 31% was reported.[7] A mortality rate of 44% was reported from Ogbomosho, southwest Nigeria.[1] Unuigbe and Ogunrin reported a mortality rate of 26.2% with an age-adjusted fatality rate of 16.2% for those less than 40 years of age. This increased to 75% for those patients above 70 years of age.[15] Ojini and Danesi reported an overall CFR of 36.96% (33.19% for men and 44.44% for women) in their series from Lagos.[13] Hesse *et al.* reported CFR that varied from 25% in 1999 to 72.7% in 2001 at the Korle-bu Teaching Hospital, Ghana.[14] Mortality rates as low as 10% have been reported from units with facilities for intensive care.[6] Case fatality rate has

remained consistently high in our environment due to lack of intensive care facilities. Complications like aspiration pneumonitis, laryngospasm, respiratory failure resulting from any of the foregoing continue to render clinicians powerless in such a setting.

In this series, mortality was significantly affected by patient's age, with age above 40 years being associated with a higher case fatality rate. This may be due to diminished levels of circulating antibodies to tetanus.[10] Additionally, mortality was higher in patients with a short incubation period (less than 7 days) compared with those with incubation period greater than 7 days ($P < 0.05$).

The average daily diazepam administered was also higher in patients who died compared to those who survived ($P < 0.05$). A similar finding was reported by Arogundade *et al*. from Ile-Ife, Nigeria.[10] Working peripherally without depressing cortical centers, diazepam controls the spasms in tetanus by blocking spasm-generating polysynaptic reflexes caused by blockage of the release of inhibitory neurotransmitters in the spinal synapses by tetanospasmin. It has no cardiovascular or endocrine effects. Very high doses of diazepam have been used and have proved diazepam to be a good muscle relaxant. There is however need for mechanical ventilation in such situations in view of respiratory depressant effects at such high doses.[5] The elimination of diazepam and its main active metabolite, desmethyl-diazepam, seems to be dose-independent. Rapid clinical recovery after high diazepam doses is not attributable to rapid elimination of active compounds from the body, but more likely to adaptation or tolerance to their depressant effects. On the other hand, prolonged coma after long-term therapy with high doses is possible.[16] There is need for provision of guidelines for dosing diazepam in settings without mechanical ventilators to achieve spasms control without causing significant respiratory depression.

There was no significant association of gender, period of onset, immunization status, wound debridement, anti-tetanus serum, fever, blood pressure and tachycardia with chances of survival in this study. The main limitation of this study is the fact that information about some patients was incomplete in view of the retrospective nature of the study. This might have introduced some bias in the findings.

In conclusion, tetanus reflects a failure of the health care delivery system to provide adequate immunization. There is therefore a need to intensify efforts at preventive tetanus immunization and adequate wound care and to install facilities for intensive care.

References

1. Oladiran I, Meier DE, Ojelade AA, OlaOlorun DA, Adeniran A, Tarpley JL. Tetanus: continuing problem in the developing world. World J Surg 2002;26:1282-5.
2. Chapp-Jumbo EN. Neurological infections in a Nigerian University Teaching Hospital. Afr Health Sci 2006;6:55-8.
3. Bandele EO, Akinyanju MO, Bojuwoye BJ. An analysis of tetanus deaths in Lagos. J Natl Med Assoc 1991;83:55-8.
4. Grange AO. Neonatal tetanus in Lagos metropolis. Niger J Paed 1991;18:12-21.
5. Ismoedijanto, Nassiruddin M, Prajitno BW. Case report: Diazepam in severe tetanus treatment. Southeast Asian J Trop Med Public Health 2004;35:175-80.
6. Bardenheier B, Prevots DR, Khetsuriani N, Wharton M. Tetanus surveillance- united States, 1995-1997: Morbidity and Mortality Weekly Report; 1998. Report No. 47: p. 1-13.
7. Odia OJ, Njoku CH. Management of adult tetanus: A 5 year experience with the use of continous infusion of diazepam and methocarbamol. Orient J Med 1991;3:142-5.
8. Onwuchekwa AC, Ihekwaba AE. Adult tetanus at the University of Port Harcourt Teaching Hospital: An analysis of 42 cases 2006. Port Harcourt Med J 2006;1:44-7.
9. Statistical Package for Social Sciences (SPSS) for Windows, Rel.11.0.1. Chicago: SPSS Inc; 2002.
10. Arogundade FA, Bello IS, Kuteyi EA, Akinsola A. Patterns of presentation and mortality in tetanus: A 10-year retrospective review. Niger Postgrad Med J 2001;11:198-202.
11. Oke DA. Medical admissions into the intensive care unit (ICU) of the Lagos University Teaching Hospital. Niger Postgrad Med J 2001;8:179-82.
12. Eke N, Sapira MK, Echem RC. Spectrum of urological procedures in University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria. Nig J Clin Pract 2007;10:74-8.
13. Ojini FI, Danesi MA. Mortality of tetanus at the Lagos University Teaching Hospital, Nigeria. Trop Doct 2005;35:178-81.
14. Hesse IF, Mensah A, Asante DK, Lartey M, Neequaye A. Adult tetanus in Accra, why the high mortality? An audit of clinical management of tetanus. West Afr J Med 2005;24:157-61.
15. Ogunrin OA, Unuigbe EI. Tetanus: an analysis of the prognosticating factors of cases seen in a tertiary hospital in a developing African country between 1990 and 2000. Trop Doct 2004;34:240-1.
16. Ochs HR. Plasma levels following high diazepam doses in intensive-care medicine. Anasth Intensivther Notfallmed 1981;16:143-4.

Source of Support: Nil, **Conflict of Interest:** None declared.